UK and Korean teams refine techniques for human cloning

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New treatments based on stem cell technology moved nearer to becoming a realistic possibility, with a UK research group reporting last week that it had successfully cloned a human blastocyst and South Korean researchers reporting that they had created stem cells to match individuals for the first time.

Researchers from the University of Newcastle upon Tyne's Centre for Life reported that they had removed the nuclei from oocytes obtained from 11 women and replaced them with DNA from embryonic stem cells.

Three of the resulting clones lived and grew in the laboratory for three days, and one survived for five days. The blastocyst had identical DNA to the stem cell line, proving that it had resulted from cloning. The study was published on 19 May in *Reproductive and BioMedicine Online* (www.rbmonline.com, search for article number 1872).

The critical factor for successful cloning seemed to be how quickly the oocyte was collected and manipulated. The cloned embryo that lasted for five days was produced from an egg that had been collected and manipulated within 15 minutes of being removed from the donor.

This was more successful than using eggs that were two days old (these eggs were left over after failed attempts at in vitro fertilisation), eggs that were six hours old, or immature eggs obtained during gynaecological procedures.

Alison Murdoch, professor of reproductive medicine at the Newcastle Fertility Centre at the Centre for Life, reported: "The time from oocyte collection to nuclear transfer seems to be crucial, and we only had success with oocytes which were enucleated within one hour. Three out of 10 eggs survived nuclear

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transfer, and one of these went on to develop into a blastocyst."

Professor Murdoch said that the ultimate aim of the technology is to use cloned embryos to produce stem cells, which have the potential to develop into any type of cell in the body. These could be used to study disease processes at the cellular level and to develop treatments. They could also be used to treat the person providing the "parent" DNA, because the genetically identical cloned cells would not be rejected by the person's immune system.

A South Korean team reported that it had created stem cells to match individuals for the first time and showed that the technique was reproducible by repeating it successfully several times. Like the UK group, the Korean researchers found that cloning was successful only when they used freshly harvested oocytes from young, fertile women instead of eggs left over from fertility treatments. This increased the researchers' effi-

ciency by more than 10-fold in comparison with when they produced the world's first cloned human blastocyst last year (*Science Online*, www.scienceonline.org, 19 May, doi: 10.1126/science.1112286).

The resulting 11 new stem cell lines matched the nuclear DNA and showed immunological compatibility with cells from the people donating the nuclei. All the cell lines were derived from patients with single cell defects who might be suitable for stem cell therapy: nine had spinal cord injuries, one had a genetic immune disorder, and one had type 1 diabetes.

Professor Woo Suk Hwang, from the College of Veterinary Medicine at Seoul National University, cautioned that hurdles still needed to be overcome before the cloned cells could be used therapeutically. Stem cell lines produced from patients may display some of the characteristics of their disease, and ways needed to be developed to direct the

growth of stem cells into stable cell types.

Despite this, Professor Chris Higgins, from the UK Medical Research Council, said: "It really is an advance. It offers the possibility of stem cell therapies without rejection. These scientists have improved their technique and reliability of stem cell transfer."

Professor Murdoch praised the Korean team for publishing full details of its techniques rather than keeping them secret and applying for a patent.

However, in criticising the research Dr David King, director of Human Genetics Alert, an independent group funded by a British charity, said: "This research is both unethical and irresponsible. I am not a pro-lifer, but I still think it is wrong to create a potential human life purely as a tool for research." He was also concerned that the technique could potentially be used for reproductive cloning rather than therapeutic cloning. □